UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

SINGULAR COMPUTING LLC,	Civil Action No. 1:19-cv-12551-FDS
Plaintiff,	
v.	Hon. F. Dennis Saylor IV
GOOGLE LLC,	
Defendant.	

MEMORANDUM OF LAW IN SUPPORT OF
PLAINTIFF'S MOTION TO COMPEL INSPECTION, TESTING, AND SOURCE CODE
OF THE ACCUSED PRODUCTS

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ATTORNEYS FOR THE PLAINTIFF

1

Plaintiff, Singular Computing LLC ("Singular"), respectfully submits this Memorandum

of Law in support of its motion to compel the inspection and testing of the accused TPUv2 and

v3 processing boards. Defendant, Google LLC ("Google"), has refused Singular's numerous

requests for such inspection and thwarted Singular's ability to test the accused products. For the

reasons set forth below, the motion should be granted.[1]

I.   INTRODUCTION

A. Facts

The Amended Complaint and Singular's infringement contentions specifically allege that the

accused infringing products are Google's Tensor Processing Units ("TPU") v2 and v3. Dkt. No.

37, ¶¶ 21.22. The Amended Complaint also specifically identifies the two infringing boards:

> 89.   A TPUv2 and a TPUv3 Device are examples of a "*device*," as claimed by the '273
>
> patent. As published by Google:
>
> #### TPU versions
>
> Each TPU version defines the specific hardware characteristics of a TPU device. The TPU version
> defines the architecture for each TPU core, the amount of high-bandwidth memory (HBM) for each
> TPU core, the interconnects between the cores on each TPU device, and the networking interfaces
> available for inter-device communication.
>
> #### Cloud TPU
>
> When you request one "Cloud TPU v2" on Google Cloud Platform, you get a virtual machine (VM) which has a PCI-
> attached TPU board. The TPU board has four dual-core TPU chips. Each TPU core features a VPU (Vector Processing
> Unit) and a 128x128 MXU (Matrix multiply Unit). This "Cloud TPU" is then usually connected through the network to the
> VM that requested it. So the full picture looks like this:
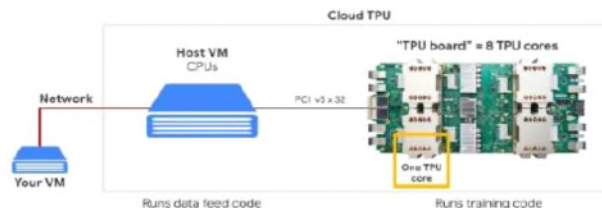
> 90.   Each TPUv2 and TPUv3 Device infringes claim 53 of the '273 patent, by *inter*
>
> *alia*, including over 100,000 matrix multiplication unit (MXU) arithmetic logic units (ALUs) and
>
> associated circuitry.

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[1] Concurrently herewith, Singular is filing a motion to modify the Scheduling Order to allow
Singular to take three short (two hours or less) depositions next week.

a.   Each TPUv2 Device has 8 MXUs (one MXU per TPU core, 2 TPU cores per chip, and 4 chips per TPUv2 Device), and each TPUv3 Device has 16 MXUs (two MXUs per TPU core, 2 TPU cores per chip, and 4 chips per TPUv3 Device). As published by Google:

- TPU v2:
  - 8 GiB of HBM for each TPU core
  - One MXU for each TPU core
  - Up to 512 total TPU cores and 4 TiB of total memory in a TPU Pod
- TPU v3:
  - 16 GiB of HBM for each TPU core
  - Two MXUs for each TPU core
  - Up to 2048 total TPU cores and 32 TiB of total memory in a TPU Pod

TPU v2 - 4 chips, 2 cores per chip   TPU v3 - 4 chips, 2 cores per chip
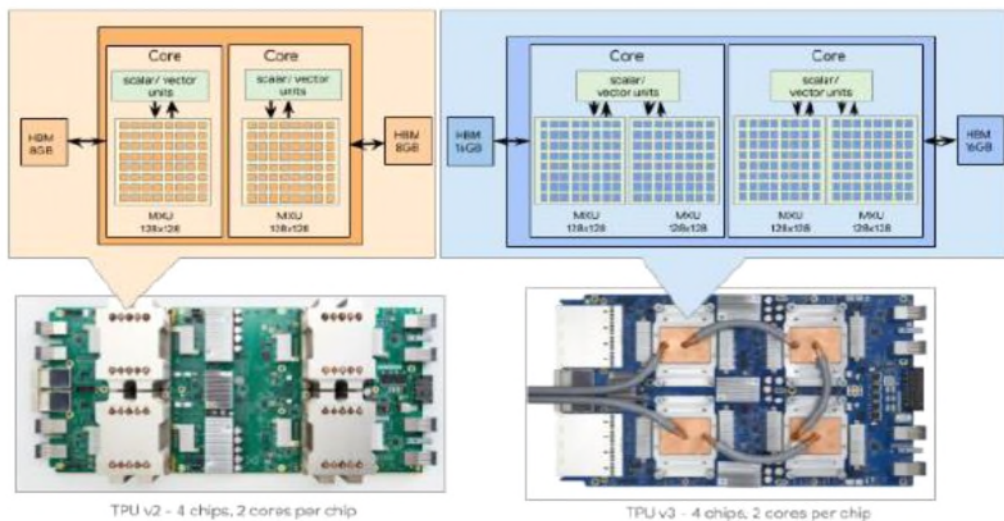
Id. at ¶¶ 89, 90.

The accused products are not sold and their use is limited to the confines of Google's super-secure datacenters. Dkt. No. 131 at p. 7 ("I don't believe the TPU board, as far as we've been told from engineering, can run outside of that setup."). The accused TPU boards are also incapable of operating without Google-specific servers. *Id.* ("The board is coded to Google-specific servers, and so those servers are also within Google's data centers."). Accordingly, it is

impossible for the jury to conceptualize how the accused products are used without the benefit of

detailed trial demonstratives that depict exactly how these products are used by Google.

Singular's infringement allegations rely on Google's use of the accused products. The only

way to convey to a jury how the accused product is used is to show their use in a Google

datacenter. Moreover, testing of the accused products will give Singular the best evidence of

whether or not the accused products operate in accordance with Singular's allegations. Thus,

there can be no legitimate dispute that inspection and testing of the TPUv2 and v3 boards are

relevant to Singular's infringement claims.

Singular's infringement allegations are also based on the structure and operation of the

Accused Products, which is defined by source code that Google has thus far refused to produce.

Google represented to the Court and to Singular that this source code would be made available,

but it was not.

B.   The Discovery Dispute and Singular's Compliance with L.R. 37.1

This Court previously ordered Google to produce samples of the Accused Products in

accordance with Local Patent Rule 16.6(d)(4)(B) and Rule 26(b)(1). *See* Dkt. No. 127. During

the course of briefing this issue, Google offered to allow Singular to test the accused products

using the Google Cloud. Dkt. No. 104 at p.4 ("Google offered to provide Singular a Cloud TPU

account through which Singular could run whatever numerical simulations it wanted on Google's

hardware."). Singular accepted that offer. Dkt. No. 107 at p. 4 ("[Singular] accepts Google's

offer to allow Singular to test the accused products using the Google Cloud.").

Since that discussion Singular made several attempts to conduct testing using a Cloud

TPU account. In each such instance, Singular wanted to run the appropriate testing and Google

refused the request for more compute that Singular felt would be necessary in order to complete

the testing in the time required. Singular conveyed this to Google and requested that counsel for Singular be provided with the necessary resources to conduct the appropriate tests. *See* Ex. A, July 19, 2021 correspondence from D. Shah. Google declined. *Id.*

Singular also requested the opportunity to inspect Google's data centers where the accused products are used. *See* Ex. B, February 19, 2021 email from K. Gannon. Google also denied this request. *See* Ex. A.

Lastly, Singular previously filed a motion requesting this Court to compel the production of the microarchitecture specifications that detail how the accused products operate. The microarchitecture specifications produced were only in draft form. Singular moved the Court asking for the final specifications. At oral argument, Google's counsel represented that there are no final specifications and the code was written prior to any specification and is the best indicator of how the accused products operate. *See* Ex. C, Transcript dated June 30, 2021("There are different drafts of this microarchitecture specification and we have provided – in fact, I think we provided… the 'closest' thing to final that we have."). Following this hearing, Singular and its expert flew to San Francisco to review this source code to find that none of the source code that was specifically requested had been produced. This issue was further exacerbated when, during the course of depositions, several witnesses testified that relevant information could be derived from the source code.

II.   LEGAL STANDARDS

The Federal Rules of Civil Procedure permit "discovery regarding any non-privileged matter that is relevant to any party's claim or defense" or discovery of any information that "appears reasonably calculated to lead to the discovery of admissible evidence." Fed. R. Civ. P. 26(b)(1). Because "discovery itself is designed to help define and clarify the issues," the limits

set forth in Rule 26 must be "construed broadly to encompass any matter that bears on, or that

reasonably could lead to other matters that could bear on, any issue that is or may be in the case."

Oppenheimer Fund, Inc. v. Sanders, 437 U.S. 340, 351 (1978). Further, the Supreme Court long

ago determined that the Federal Rules of Civil Procedure are to be construed liberally in favor of

discovery. *Hickman v. Taylor*, 329 U.S. 495, 507 (1947); *see also SEC v. Sargent*, 229 F.3d 68,

80 (1st Cir. 2000) (quoting Hickman).

Fed. R. Civ. P. 34(a)(2) provides that "[a] party may serve on any other party a request

within the scope of Rule 26(b): (1) to produce and permit the requesting party or its

representative to inspect… [or] test (B) any designated tangible things; or (2) to permit entry

onto designated land… so that the requesting party may inspect… any designated object or

operation on it." The moving party bears the initial burden of showing that the materials and

information sought are relevant to the action. *Controlled Kinematics, Inc. v. Novanta Corp.*, No.

17-cv-11029, 2019 WL 3082354, at * 2 (D. Mass. Jul. 15, 2019). "Once a showing of relevance

is made, the party opposing disclosure bears the burden of showing that the requested discovery

is improper." *Id*.

III.   ARGUMENT

To prove patent infringement, the patentee must establish that an accused device contains

each limitation of the asserted claim(s). *See Cybor Corp. v. FAST Technologies, Inc*., 138 F.3d

1448, 1467 (Fed.Cir.1998). Courts recognize the essential nature of testing and inspection of the

accused products in patent infringement cases. *See Henrob Ltd. v. Bollhoff Systemtechnick*

GmbH & Co., No. 05-CV-73214-DT, 2007 WL 2572028, at *2 (E.D. Mich. Sept. 5, 2007)

(compelling inspection and testing of accused products finding that "is necessary to allow

Plaintiff a meaningful opportunity to substantiate its infringement claim."); *see also Aristocrat*

Techs. v. Int'l Game Tech., No. C 06-03717 RMW (RS), 2009 WL 3573327, at *5 (N.D. Cal.

Oct. 30, 2009) (compelling inspection of non-accused product with "the same or substantially

similar features as the accused products" because it may lead to relevant and admissible

evidence.).

A. <u>INSPECTION AND TESTING OF THE TPU BOARDS IS DIRECTLY RELEVANT
     TO SINGULAR'S CLAIMS AND SHOULD BE PERMITTED</u>

Where the requested inspection and testing "are indisputably relevant to the claims and

defenses in the matter," they should be allowed. *See*, *e.g.*, *Integra LifeSciences Corp. v.*

HyperBranch Med. Tech., Inc., No. 15-819, 2016 WL 675553, at *1 (D. Del. Feb. 12, 2016).

Discovery related to a defendant's products is relevant when it bears upon whether those

products infringe the asserted patents. *See Negotiated Data Sols. LLC v. Dell, Inc.,* No. C09-

80012MISC JF (HR, 2009 WL 733876, at *3 (N.D. Cal. Mar. 17, 2009) ("Inasmuch as

NVIDIA's code bears upon the operation of NVIDIA's chips that allegedly provide some of the

accused functions in Dell's chips, this court finds that it is relevant within the broad standard for

discovery under Fed. R. Civ. P. 26."). As set forth *supra*, the TPUv2 and v3 boards are central,

and therefore relevant, to Singular's claims of infringement of each of the patents-in-suit. Thus,

Singular has met its burden under Rule 37. *See*, *e.g.*, *Controlled Kinematics*, 2019 WL 3082354,

at * 2.

As set forth above, courts recognize the essential nature of testing and inspection of the

accused product in patent infringement cases. *See RevoLaze LLC v. J.C. Penney Corp., Inc*., No.

2:19-CV-00043-JRG, 2020 WL 1984322, at *3 (E.D. Tex. Apr. 27, 2020) (ordering production

of samples for inspection and testing). Thus, courts routinely grant motions to compel testing

and inspection of the accused product in patent infringement cases. *See Kimberly-Clark*

Worldwide, Inc. v. First Quality Baby Prod., LLC, No. 09-C-0916, 2010 WL 2990753, at *3

(E.D. Wis. July 27, 2010)(compelling inspection of manufacturing process that related to specific patents at issue in the case.); *see also Berry Plastics Corp. v. Intertape Polymer Corp.*, No. 3:10-CV-76-RLY-WGH, 2011 WL 4950013, at *2 (S.D. Ind. Oct. 17, 2011) (finding "[i]nspections are not an extraordinary means of discovery in a patent suit.").

Discovery in this case should not end[2] without Singular being afforded the opportunity to inspect and test the accused products that are at the heart of its infringement allegations. As in the cases cited above, Google should be ordered to allow Singular to test and inspect the accused products.

B.   SINGULAR'S INSPECTION AND TESTING REQUEST ARE NOT UNDULY
       BURDENSOME

Google will not be unduly burdened by providing the proper access Singular needs in order to test the accused products. The testing will be conducted virtually through Google's Cloud TPU portal. Singular simply needs the proper credentials to conduct those tests. Moreover, the burden on Google will also be minimal because Singular seeks to test the accused products in the same manner that Google's own engineers test the products. *See* Dkt. No. 131 at p. 12 ("Even Google's own engineers test this code virtually through the same cloud TPU portal that we're offering Singular to do the testing from."). Therefore, providing Singular with the proper credentials to perform the necessary testing will be virtually effortless for Google. *See Excelligence Learning Corp. v. Oriental Trading Co.*, No. 5:03-CV-4947 JF (RS), 2004 WL 2452834, at *7 (N.D. Cal. June 14, 2004) (finding no undue burden where "the requested information is available on a database and may be quickly accessed, copied and provided to Excelligence").

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[2] The current deadline for fact discovery is July 23, 2021. As set forth above, Singular requested the inspection and testing of the accused TPU devices well before the deadline.

Singular also wants the ability to inspect and record a data center so that Singular can have the ability to present such evidence to the jury at trial. As the accused products are used exclusively within Google's datacenters, Singular should be afforded the opportunity to present the jury with this evidence that will convey clearly where and how the accused products are actually used in performing the alleged infringing activities. *See Ficep Corp. v. Haas Metal Eng'g, Inc.*, No. 14-243-CM, 2015 WL 566988, at **3-4 (D. Kan. Feb. 11, 2015) (compelling inspection and videotaping of the use of the accused products *in situ*).

C. GOOGLE SHOULD BE REQUIRED TO PRODUCE ALL RELEVANT SOURCE CODE

The requested source code is irrefutably relevant. The Local Rules specifically require that Google produce its source code to allow for Singular to determine how the accused products operate. L.R. 16.6(d)(4). Furthermore, Google's own counsel conceded that the source code is the best indicator for how the accused products operate. *See* Ex. C ("[T]he blueprints for how these chips are built is the system Verilog code.").

More specifically, Google failed to produce the following source code:

- ██

██

██. See, e.g., Ex. D, Dean Tr. (Rough) at

110-112; 2.

- ██

- all other source code corresponding to the TensorCore in the TPU v2 and TPU v3 products, to the extent that this source code has not yet been made available to Singular

Indeed, Google's own witnesses have attested to the relevance of the code in question at their own depositions. For example, Dr. Norman Jouppi, Google's designated 30(b)(6) witness on technical topics, testified a number of times during his deposition that he would be unable to answer Singular's questions without reference to relevant source code—source code that Google has yet to make available to Singular on its source code review computer. *See, e.g.* Ex. E, Jouppi Tr. at 67:2, 80:12, 81:17-82:3. Also, Dr. Jeff Dean, a very highly placed and influential engineer at Google, ██

████████████████████████—code that, again, has not been made available to Singular. *See, e.g.*, Ex. D, Dean Tr. (Rough) at 110-112.

Given that this code is directly relevant to this matter, Singular respectfully requests that this Court compel its production.

III.   CONCLUSION

For the reasons set forth above, Singular requests that this motion be granted.

Dated: July 23, 2021   Respectfully submitted,

                                        /s/ Paul J. Hayes
                                        Paul J. Hayes (BBO #227000)
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                                        Kevin Gannon (BBO #640931)
                                        Daniel McGonagle (BBO #690084)
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ATTORNEYS FOR THE PLAINTIFF

<u>CERTIFICATE OF SERVICE</u>

I certify that on July 23, 2021, I served this document on Defendant by causing a copy to be sent via electronic mail to its counsel of record.

/s/ Paul J. Hayes